CLAIMS

1. A coreless printed circuit board transformer comprising first and second windings deposited on opposed sides of a printed circuit board and having no transformer core therebetween.

2. A transformer as claimed in claim 1 wherein said transformer is operated at an optimum frequency at which frequency the impedance of a transformer equivalent circuit is at its maximum.

3. A transformer as claimed in claim 1 wherein said transformer is operated at a frequency of between 300 kHz and 20 MHz.

4. A transformer as claimed in claim 1 wherein said transformer is operated by a high-frequency carrier signal modulated by a low-frequency switching signal.

5. A transformer as claimed in claim 4 wherein said carrier signal is at an optimum frequency corresponding to a maximum impedance of said transformer.

6. A transformer as claimed in claim 4 wherein said high frequency carrier signal is in the range of from 300 kHz to 20 MHz and said low frequency switching signal is in the range of from DC to 300 kHz.

7. A transformer as claimed in claim 1 further comprising means for adjusting the resonant frequency of the transformer.

8. A transformer as claimed in claim 7 wherein said adjusting means comprises a capacitance connected across the second winding.

9. A gate drive circuit for a power MOSFET or IGBT device, wherein the gate of a said device is isolated from an input power supply by a coreless printed circuit board

transformer, said transformer comprising first and second windings deposited on opposed sides of a printed circuit board.

10. A gate drive circuit as claimed in claim 9 wherein said transformer is operated at a frequency corresponding to the maximum impedance of said transformer.

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11. A gate drive circuit as claimed in claim 9 ~~or 10~~ wherein said transformer is driven and said gate is switched at a high-frequency in the range of from 300 kHz to 20 MHz.

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12. A gate drive circuit as claimed in claim 9 ~~or 10~~ wherein said transformer is operated by a high frequency carrier signal, said carrier signal being modulated by a switching frequency for switching said gate.

13. A gate drive circuit as claimed in claim 12 wherein said high frequency carrier signal is at an optimum frequency corresponding to a maximum impedance of said transformer.

14. A gate drive circuit as claimed in claim 12 wherein said high frequency carrier signal is in the range of from 300 kHz to 20 MHz and said low frequency switching signal is in the range of from DC to 300 kHz.

15. A gate drive circuit as claimed in claim 9 wherein said transformer includes means for adjusting the resonant frequency of the transformer.

16. A gate drive circuit as claimed in claim 15 wherein said adjusting means comprises a capacitance connected across said second winding.

17. A method of driving a gate of a power MOSFET or IGBT device comprising isolating said gate from a power supply by means of a coreless printed circuit board transformer, said transformer comprising first and second windings deposited on opposed sides of a printed circuit board with no transformer core therebetween.

18. A method as claimed in claim 17 wherein said gate is driven at a frequency at which the impedance of said transformer is at a maximum.

19. A method as claimed in claim 17 wherein said gate is driven at a high frequency in the range of from 300 kHz to 20 MHz.

20. A method as claimed in claim 17 wherein a low switching frequency is used to modulate a high frequency carrier signal input to said transformer, and wherein said carrier signal is demodulated after said transformer to drive said gate at said low switching frequency.

21. A method as claimed in claim 20 wherein said carrier signal is at an optimum frequency for said transformer corresponding to a maximum impedance of said transformer.

22. A method as claimed in claim 20 wherein said high frequency carrier signal is in the range from 300 kHz to 20MHz and said low frequency switching signal is in the range of from DC to 300 kHz.

23. A modem for digital data communication including a coreless printed circuit board transformer comprising first and second windings deposited on opposed sides of a printed circuit board and having no transformer core therebetween.

24. A coreless printed circuit board transformer comprising first and second windings deposited on opposed sides of a printed circuit board and having no transformer core therebetween, and comprising means for adjusting the resonant frequency of the transformer.

25. A transformer as claimed in claim 24 wherein said adjusting means comprises a capacitance connected across the second winding.

26. A coreless printed circuit board transformer comprising first and second windings deposited on opposed sides of a printed circuit board and having no transformer core therebetween, wherein said transformer is operated at an optimum frequency which is at or near the frequency at which the impedance of a transformer equivalent circuit is at its maximum.

27. A transformer as claimed in claim 26 wherein said transformer is operated at a frequency of bout 100kHz to at least 20MHz.

28. A transformer as claimed in claim 26 wherein said transformer is operated by a high-frequency carrier signal modulated by a low-frequency switching signal, said carrier signal being at a frequency corresponding to the maximum impedance of the transformer.

29. A transformer as claimed in claim 28 wherein said carrier signal is at a frequency of about 100kHz to at least 20MHz and said switching signal is at a frequency of between DC and 300kHz.

30. A gate drive circuit for a power MOSFET or IGBT device, wherein the gate of said device is isolated from an input power supply by a coreless printed circuit board transformer as claimed in any of claims 26~~to 29.~~

31. A method of driving a gate of a power MOSFET or IGBT device comprising isolating said gate from a power supply by means of a coreless printed circuit board transformer, said transformer comprising first and second windings deposited on opposed sides of a printed circuit board with no transformer core therebetween, wherein said gate is driven at a frequency at which the impedance of said transformer is at a maximum.

32. A method as claimed in claim 31 wherein said gate is driven at a frequency in the range of from about 100kHz to at least 20MHz.

33. A method as claimed in claim 31 wherein a low frequency switching signal is used to modulate a high-frequency carrier signal input to said transformer, and wherein said

carrier signal is demodulated after said transformer to drive said gate at said low switching frequency, said carrier signal being at a said maximum impedance frequency.

34. A method as claimed in claim 33 wherein said carrier signal is at a frequency of from about 100kHz to at least 20MHz and said switching signal is at a frequency of from DC to 300kHz.

35. Power converter apparatus including a coreless printed circuit board transformer comprising first and second windings deposited on opposed sides of a printed circuit board and having no transformer core therebetween, wherein said transformer is operated at a maximum efficiency frequency which is slightly lower than the frequency at which the impedance of a transformer equivalent circuit is at its maximum.